

Analysis of the Correlation between Green Finance and Arab Financial Market Performance from 2015 to 2024: Algeria Case Study

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Abstract---This study seeks to examine the impact of green finance on the performance of Arab financial markets from 2015 to 2024, focusing on six Arab countries: Saudi Arabia, Qatar, Jordan, Morocco, Tunisia, and Egypt, with a specific emphasis on Algeria. The study employed an econometric methodology using panel data to assess the correlation between the primary variables: green finance and financial market performance, incorporating control variables such as gross domestic product (GDP), inflation rate, and interest rate. The research additionally analyzed the Algerian financial market and the country's efforts in green financing. The study's principal findings indicated a robust, favorable, and statistically significant correlation between green finance and the performance of Arab financial markets. Nonetheless, the Algerian market is constrained in its efficacy due to a deficient investment culture and a lack of engagement with both the stock exchange and green financial products.

Keywords---Arab financial market performance, green finance, gross domestic product (GDP), inflation rate, interest rate.

Jel Classification Codes: XNN; XNN; XNN, for more details see:

<https://www.acaweb.org/jel/guide/jel.php>

Introduction

In the last two decades, there has been a significant transformation in the notions of investing and finance. Green finance has arisen as a strategic instrument designed to align economic and environmental objectives by funding environmentally sustainable projects, including energy transition, green infrastructure, and carbon reduction activities. Green finance has garnered international attention with the ratification of the Paris Climate Agreement (2015), leading numerous countries, particularly

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those in the Arab region, to change their financial policies and investment markets accordingly. Financial markets accurately mirror economic activity and are directly influenced by economic, political, and environmental fluctuations. Consequently, the rising volume of green financing is anticipated to manifest in the performance of these markets, regarding both investment appeal and growth metrics. Notwithstanding the increasing global interest, research investigating the correlation between green finance and financial market performance in Arab countries is scarce, particularly due to the differences in market maturity and the diverse degrees of involvement in green initiatives.

This study explores this correlation by examining data from six Arab countries in the period between 2015 and 2024, particularly focusing on Algeria, which exhibits an increasing interest in environmental reforms but possesses a less dynamic financial market relative to its regional counterparts. Given the increasing global interest in green finance and its correlation with financial market performance, the research question is:

To what extent did green finance impact the performance of Arab financial markets from 2015 to 2024, and what is Algeria's position within this context?

This inquiry then gives rise to the ensuing sub-questions:

1. What is the extent of growth of green finance in Arab financial markets?
2. Is there a statistically significant correlation between the volume of green finance and the success of the Arab stock market index?
3. Can green finance serve as a stimulus for attracting financial investments?

• **Research Hypotheses:**

The hypotheses of the study are as follows:

H 1: No statistically significant correlation exists between green finance and the performance of Arab financial markets from 2015 to 2024.

H 2: A positive correlation exists between the volume of green finance and the financial market performance index in Arab countries.

H 3: The strength of the correlation between green finance and market performance is contingent upon the degree of financial market maturity.

• **Research Objectives:**

The objectives of the study are as follows:

- To assess the correlation between the volume of green financing and the performance of financial markets in the examined countries.
- To elucidate Algeria's initiatives in the domain of green financing.
- To suggest recommendations to financial policymakers on improving the environmental aspect of investment policies.

Importance:

The significance of the study can be encapsulated in the following points:

The topicality of green finance, a contemporary issue, and its association with the financial market performance of some Arab countries, particularly given the lack of comprehensive research on this subject.

Besides, this research helps policymakers and financial institutions in the development of more sustainable funding instruments. It improves comprehension of the realities of Arab financial markets amid environmental challenges. Furthermore, it elucidates Algeria's position and the difficulties associated with its participation in the sustainable financing system.

• **Literature Review:**

- The study of Ribal Rizk and Joelle Matta (April 2025) entitled "**The Impact of Green Finance and Green Consumption on Sustainable Economies: A Comparative Study of Lebanon and the UAE.**" The research analyzed the impact of green financing and green

consumption on establishing a sustainable economy via a comparative theoretical framework between Lebanon and the UAE. The study determined that the UAE exemplifies an advanced model in the area due to its green finance laws and activities, but Lebanon is hindered by inadequate institutional and financial infrastructure required for such financing. This study underscores Arab inequities, emphasizing their significance.

- Remache Manal's study (2023-2024) entitled **"The Impact of Green Finance on Economic Growth in China: Econometric Study during the Period 2000-2022"**. This study examined the impact of green finance on economic growth in China from 2000 to 2022 via an econometric analysis using ARDL model. The latter was developed using multiple explanatory variables: green investment, green insurance, foreign direct investment, industrial structure, and trade openness. The study identified a substantial favorable impact of green investment on economic growth in both the short and long term, whereas green spending exhibited little impact on economic development due to the impact of the phase of infrastructure development that enhances the environment and mitigates pollution. Green insurance has not influenced economic development due to enforced constraints and its inability to encompass all environmental hazards. Although the impact of green finance indicators on economic development is limited, it aims to foster and advance economic and social development through diverse green finance instruments and strategies.
- Myvel Nabil's study (January 2024) entitled **"Assessment of the Correlation among Climate Change, Green Finance and Financial Stability: Evidence from Emerging and Developed Markets. International Journal of Economics and Finance."** This study evaluates the correlation between climate change, green financing, and financial stability on a yearly basis from 2013 to 2021 across 14 countries, emphasizing both developing and developed economies. The study initially investigates the impact of climate change on financial stability within a certain country. It also investigates the impact of green finance on financial stability and its impact on climate change, using carbon dioxide emissions as an indicator of climate change. Green finance was assessed via green secured assets, green loans, and green bonds, and financial stability was evaluated using the Z-score index. Panel data analysis reveals a substantial negative impact of carbon dioxide emissions on financial stability, whereas green financing, especially through green loans, exerts a favorable impact on financial stability in these markets.

Our study diverges from prior literature in numerous significant respects. In fact, it is among the initial investigations on the correlation between green finance and the performance of Arab financial markets. It seeks to ascertain this correlation in contrast to prior literature that concentrated on the effects of green finance on economic growth and financial stability. This study focuses on a recent timeframe, 2015-2024, subsequent to the Paris Climate Agreement which provides a more contemporary perspective compared to prior research that did not emphasize this crucial period.

• **Research Plan:**

The study comprises three primary elements, detailed as follows:

1. Fundamental Principles of Green Finance
2. Performance of Arab Financial Markets
3. Assessing the impact of Green Finance on the Arab Financial Market Performance
4. Algeria Case Study

1. Fundamental Principles of Green Finance:

The global economy confronts escalating challenges due to climate change and natural disasters, along with the resultant financial and human tolls they inflict. Industrial activity, urban expansion, and overdependence on carbon-based energy have intensified pollution, desertification, and

greenhouse gas emissions, undermining environmental equilibrium and threatening economic stability. Given these dangers, green finance has emerged as a crucial vehicle for reallocating resources to ecologically sustainable initiatives that promote sustainable development and enhance quality of life, establishing it as an essential foundation for constructing a more resilient and sustainable economy.

1.1. Definition of Green Finance :

Green finance is a strategic approach to attaining equitable financing that incorporates environmental considerations by orienting investments into ecologically sustainable projects that mitigate carbon emissions and enhance the utilization of natural resources. (Md. Sazib Miyan, 2024, p. 90) The concept centers on "greening" the financial system by funding projects that promote environmental protection and mitigate climate risks, in accordance with the Sustainable Development Goals. (Al-Arabi, 2022, p. 7).

The G20 defined it as funding investments that yield environmental advantages, whilst the International Finance Corporation (IFC) described it as investments and loans aimed at safeguarding the environment and conserving its natural resources. (Jain, 2025, p. 577) Certain studies have claimed that it encompasses financial products and services that consider environmental issues in lending, monitoring, and risk management, while promoting environmentally responsible investment. (Zhang, 2021, p. 279).

Green finance necessitates the incorporation of environmental factors into financial decisions, ensuring that funds are allocated to initiatives that foster sustainability, mitigate pollution, and enhance the efficient utilization of natural resources.

1.2. Significance of Green Finance:

The significance of green finance can be encapsulated in the subsequent elements:

a. An instrument for attaining environmental sustainability:

Green finance is a significant economic instrument that orients financial resources towards initiatives that mitigate pollutants and emissions while promoting the utilization of renewable energy sources, (Saxena, December 2023, p. 335) including solar and wind energy. Consequently, green finance aids in alleviating global warming and bolstering the conservation of natural resources. (Mahadi, 2022, p. 84717)

b. A vital catalyst for the transition to a green economy:

Green finance serves as a potent mechanism for transforming the conventional economy towards a sustainable economy founded on ecologically sustainable production and service activities. (Mahadi, 2022, p. 84720) This transition aids in diminishing environmental expenses and attaining equilibrium between economic development and ecological preservation. (Luo, 2025)

c. Tackling pressing environmental concerns:

In light of the intensification of climate change and increasing levels of industrial pollution, green financing has surfaced as a potent instrument for confronting these issues. (Zournatzidou, 2025) It extends beyond funding environmental initiatives to encompass creative strategies such as carbon pricing mechanisms, green loans, and green bonds, which assist in tackling environmental challenges. (Jaishree, 2025)

d. Advancing sustainable economic development:

The impact of green finance transcends the environmental sphere, affecting the economic realm as well. It offers novel investment prospects in burgeoning sectors such as clean energy, intelligent infrastructure, and sustainable industries, fostering job creation and driving technical innovation while conserving resources. (Yao, 2025)

e. A laboratory for creative policies:

experiences implemented by certain countries – such as establishing pilot zones for green finance in China- create an appropriate setting for the experimentation with novel financial instruments and policies, (Flottmann, 2025) including tax incentives

for ecologically sustainable initiatives, the promotion of carbon trading, and the allocation of bank credit to sustainable projects. These experiments assess the efficacy of policies prior to their broad implementation. (Zheng, 2025, p. 125).

- f. **Local and global replicability:** The significance of green finance transcends national boundaries; successful implementations can provide a framework for other places. Environmental issues including climate change and air and water pollution are transboundary, necessitating the implementation of green finance systems at regional and international levels to attain global sustainable development goals. (Wang, 2021, p. 117).

1.3. Green funding instruments: They encompass:

- a. **Green Bonds:**

These are financial instruments utilized to fund renewable energy initiatives, sustainable transportation, and energy efficiency improvements. China ranks among the foremost global issuers of green bonds, with such bonds totaling 872 billion yuan in 2022. (Group, 2016, p. 31)

- b. **Green Loans:**

Green loans fund initiatives that have favorable environmental outcomes and are explicitly associated with objectives of environmental conservation and sustainability. Borrowers must exhibit transparency in fund utilization and provide reports on the environmental outcomes obtained. They are significantly important as they facilitate the transition to a green economy and promote the adoption of environmentally responsible practices by institutions, so serving as an effective instrument for mitigating long-term environmental and financial risks. (Liu, 2023, p. 112).

- c. **Green Funds:**

- d. Green funds are investment vehicles that allocate financial resources to projects and companies that comply with environmental requirements and implement sustainable practices. These funds aim to provide financial returns for investors while positively impacting the environment, serving as a crucial instrument for facilitating the transition to a low-carbon green economy and bolstering the role of sustainable finance in tackling climate concerns. (OECD, 2020, p. 62)

- e. **Green Equities:**

These pertain to investments in publicly traded companies that focus on the green economy. These assets are frequently allocated to sustainable index funds (green ETFs).

- f. **Carbon Markets:**

This category encompasses carbon credits, emissions allowances, and carbon taxes. Their objective is to assign a monetary value to emissions and include environmental expenses into economic activities. They motivate corporations to invest in ecologically sustainable solutions by imposing financial penalties for emissions. (Wan, 2022, p. 907)

2. Performance of Arab Financial Markets :

The Arab financial market plays a crucial role in mobilizing savings and orienting them into productive investments. It has experienced notable advancements recently, including the modernization of legislative and technical frameworks and the improvement of transparency. Nonetheless, its performance remains inconsistent among major stock exchanges with substantial liquidity, such as those in Saudi Arabia, the UAE, and Qatar, compared to smaller markets with limited impact. These markets encounter difficulties associated with inadequate regional integration and variable investor trust. Nonetheless, they present tremendous prospects via digitization, green financing, and the enhancement of investment instruments to facilitate sustainable development in the Arab region.

2.1. Factors Influencing the Arab Financial Market Performance :

- A. Numerous factors impact the success of Arab financial markets, which are succinctly stated as follows:
- a. Macroeconomic factors: Macroeconomic factors are significant determinants of financial market performance in the Arab world, since elevated gross domestic product (GDP) growth rates favorably impact market activity and increase its appeal to international investment. Conversely, escalating prices due to inflation result in diminished demand and impact investment returns. Interest rates directly impact investing decisions (Seznec, 2024, p. 53), as an increase diminishes stock market enthusiasm and heightens bond demand. Moreover, currency rate volatility significantly influences both foreign and domestic investments, while oil and gas prices are vital determinants for Arab markets due to their economies' substantial dependence on energy earnings. (AFCM, 2023, p. 61).
 - b. Financial and investment factors: They serve as a significant catalyst for the performance of the majority of Arab capital markets. Elevated market liquidity enhances the market's capacity to accommodate investments, whereas the variety of accessible financial products, including bonds, instruments, derivatives, and investment funds, aids in attracting a broader spectrum of investors. Moreover, the influx of foreign direct investment (FDI) bolsters stability and trust, while the efficacy of financial institutions streamlines financing processes, hence promoting equitable trade and stimulating investment activity. (AFCM, C. I., 2022, p. 69).
 - c. Geopolitical and social factors: The geopolitical and social dimensions are seen as primary determinants of the trajectory of Arab markets, as political and security stability are essential prerequisites for attracting investments and sustaining investor confidence. Any disruptions may adversely affect market performance. Regional and international events, including global financial crises and regional conflicts, induce significant market volatility while simultaneously promoting social factors that improve individual financial literacy and cultivate a culture of savings and investment, thereby enhancing market depth. (UASA, 2025).
 - d. Environmental and sustainability factors (Green & ESG): Environmental and sustainability factors are gaining prominence in Arab financial markets, with the introduction of green financing instruments like green bonds and instruments that directly enhance conventional investment vehicles. Compliance with Environmental, Social, and Governance (ESG) norms has emerged as a significant factor affecting the magnitude and trajectory of foreign investment flows. Moreover, renewable energy initiatives facilitate economic diversification, bolster market resilience, and favorably impact investors' long-term objectives (Wan Q. Q., 2022, p. 904).

3. Assessing the Impact of Green Finance on the Performance of Arab Financial Markets:

3.1. Research Methodology :

This section seeks to evaluate and analyze the impact of green finance on the performance of financial markets in a selection of Arab countries (Saudi Arabia, Qatar, Morocco, Tunisia, Jordan, and Egypt) during the period from 2015 to 2024. To attain this objective, panel data was used, and a variety of econometric models were applied. The methodology initiates with the estimation of fundamental static models (Pooled OLS, Fixed Effects, Random Effects) and identifies the most suitable model through the application of the Hausman test. A series of diagnostic tests are conducted on the chosen model to identify potential econometric issues, including heteroskedasticity, serial correlation, and cross-sectional dependence. Ultimately, contemporary estimating techniques are employed to rectify any possible model deficiencies depending on the outcomes of these tests .

3.2. Research Variables and Selection Methodology :

- a. The study variables were meticulously chosen based on the theoretical framework connecting sustainable finance, macroeconomic factors, and financial market performance, alongside an examination of prior empirical literature in this domain.
- b. Dependent Variable: Financial Market Performance (INDX): This study's dependent variable signifies financial market performance, quantified through the primary composite index of the stock exchange in each sample country (e.g., the TASI in Saudi Arabia and the EGX30 in Egypt). The natural logarithm of the index ($\ln_indx$) was employed in the analysis to reduce volatility and interpret the coefficients.
- c. Principal Independent Variable: Green Finance (GRF): This serves as the major explanatory variable in the study, intended to assess the degree of implementation of ecologically sustainable financial activities. This variable was quantified using the Green Finance Index as a proportion of GDP. The model used the natural logarithm of the variable ($\ln_grf$), chosen based on its fundamental premise. This selection is predicated on the expanding theoretical literature indicating that green and sustainable investments can affect market dynamics by attracting a novel class of sustainability-oriented investors or by signaling that companies are adopting superior long-term risk management practices, thereby augmenting their market value.
- d. Control Variables: To confirm that the observed correlation between green finance and financial market performance is not spurious and to isolate the net effect of our primary variable, it was essential to incorporate a set of control variables that theoretical and empirical literature has demonstrated to significantly impact financial market performance. The variables encompass gross domestic product (GDP), inflation rate (INF), and interest rate (INTR).

3.3. Descriptive Statistics and Correlation Analysis :

Prior to initiating the regression analysis, a descriptive statistical examination of the variables was performed to elucidate their fundamental properties. A correlation matrix was evaluated to assess the strength and direction of the correlations among the variables and to identify any potential multicollinearity issues.

Table (1): Descriptive statistics for study variables

Variable	Code	Views	Mean	Standard deviation	Minimum value	Maximum value
Financial market performance (logarithm)	$\ln_INDEX$	60	8.85	0.7	7.5	9.87
GDP (logarithm)	$\ln_GDP$	60	7.77	0.5	6.87	8.63
Green finance (logarithm)	$\ln_GRF$	60	0.52	0.39	0	1.48
Interest rate (logarithm)	$\ln_INTR$	60	1.3	0.73	0	2.96
Inflation (logarithm)	$\ln_INF$	60	1.94	0.46	0.64	3.31

Source: Prepared by the author based on Stata18 outputs

The arithmetic mean of the logarithm of the financial market performance index ($\ln_INDEX$) was 8.85, indicating the overall performance of the sampled stock exchanges. The standard deviation (0.70) signifies considerable variance and dispersion in the performance of these markets. This difference is rational considering the varied economic frameworks and financial policies of countries like Saudi

Arabia, Egypt, and Jordan. The existence of this dispersion is deemed favorable for econometric analysis, since it facilitates accurate evaluation of the impact of independent variables.

Green Finance (ln_GRF) is the fundamental variable regarding its attributes. The mean is 0.52, which is comparatively low, while the standard deviation is quite high in relation to the mean at 0.39. Moreover, the extensive range is particularly revealing, with values spanning from zero (signifying a near-complete lack of green finance in certain years or countries) to 1.48. The significant disparity is the most notable characteristic of the data for this variable, indicating that the concept and implementation of green finance are at markedly different levels of development throughout the Arab world. While certain countries may have initiated early measures, others remain at the outset of their progression. The significant disparity in the adoption of green finance renders the sample optimal for examining its effects.

The control variables demonstrate the anticipated variance. The standard deviation of the logarithm of the interest rate (ln_INTR) is 0.73, which is substantial compared to its mean of 1.30, indicating the autonomy of monetary policy and the diverse economic situations encountered by central banks in different countries. Inflation (ln_INF) and gross domestic product (ln_GDP) demonstrate significant variability, hence strengthening the model's resilience through the control of these diverse economic variables.

Table (2): Correlation matrix of study variables

Variable	ln_INDEX	ln_GDP	ln_GRF	ln_INTR	ln_INF
ln_INDEX	1				
ln_GDP	-0.232	1			
ln_GRF	0.009	0.256	1		
ln_INTR	0.326	0.527	0.23	1	
ln_INF	0.301	0.381	0.019	0.691	1

Source: Prepared by the author based on Stata18 outputs

3.4. Model Characterization and Estimation Techniques :

The correlation between green finance and financial market performance was analyzed using three fundamental panel data methodologies: the pooled OLS model, which disregards country variations; the fixed effects model, which accounts for country-specific time-invariant differences; and the random effects model. Table (3) shows the comparative results of these models.

$$\ln_indx_{it} = \beta_0 + \beta_1 \ln_grf_{it} + \beta_2 \ln_gdp_{it} + \beta_3 \ln_intr_{it} + \beta_4 \ln_inf_{it} + \epsilon_{it}$$

Table (3): Static panel model estimation results (POLS, FE, RE)

Variables	(1) Pooled OLS	(2) Fixed Effects	(3) Random Effects
ln_GRF (Green Finance)	0.065	0.182**	0.194**
	(0.205)	(0.084)	(0.082)
ln_GDP (Gross Domestic Product)	-0.799***	0.439**	0.404**
	(0.182)	(0.185)	(0.178)
ln_INTR (Interest Rate)	0.474***	0.019	0.019
	(0.160)	(0.051)	(0.050)
ln_INF (Inflation)	0.261	0.133**	0.134***
	(0.233)	(0.051)	(0.050)
Constant	13.905***	5.063***	5.332***
	(1.352)	(1.412)	(1.420)
Views	60	60	60

Number of groups		6	6
R-squared (Within)	0.34	0.635	0.634
F-statistic / Wald chi2	7.34	21.7	88.92
Prob > F / chi2	0.0001	0	0
Notes: Standard errors are in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01			

Source: Prepared by the author based on Stata18 outputs

Following the estimation of the fundamental models, two primary tests were performed for comparison: the Breusch-Pagan LM Test to differentiate between the pooled OLS model and the random effects (RE) model, and the Hausman Test to distinguish between the random effects (RE) model and the fixed effects (FE) model. Table (4) encapsulates the findings of these two assessments.

Table (4): Hausman Test results

Test	H0	Chi2	P-value	Statistical decision
Breusch-Pagan LM Test	No random effects (POLS is best)	167.69	0	Rejection of H0
Hausman Test	There is no correlation between the unobserved effects and the independent variables (RE is best)	2.31	0.6783	No rejection of H0

Source: Prepared by the author based on Stata18 outputs

The Breusch-Pagan LM test yielded a highly significant result (Prob > chibar2 = 0.0000), prompting the rejection of the null hypothesis H0 about the absence of country-specific random effects. This definitively illustrates that significant, unobserved disparities exist among the sample countries, influencing the efficacy of their financial markets, and that neglecting these disparities, as the POLS model does, will definitely result in skewed and misleading outcomes. The POLS model is excluded, and the random effects model is affirmed as superior.

The Hausman test, which differentiates between fixed effects (FE) and random effects (RE) models, is essential for assessing the systematic correlation between unobserved country-specific effects and the independent variables. The test result was entirely statistically insignificant, with a probability value (Prob > chi2) of 0.6783, which is considerably elevated and well above the 5% significance threshold. Consequently, the rejection of the null hypothesis H0 is not possible asserting that no such association exists. Statistical principles dictate that when the Hausman null hypothesis is not rejected, the random effects model is deemed the most suitable and best, as it yields unbiased estimates and is more efficient than the fixed effects model under certain circumstances.

3.5. Diagnostic Tests of the Random Effects Model :

Upon determining that the random effects (RE) model is the appropriate model for comparison, a series of diagnostic tests were performed to validate its fundamental assumptions. The purpose of these tests is to identify issues related to heteroskedasticity, serial correlation, and cross-sectional dependence. Table (5) encapsulates the findings of these tests.

Table (5): Results of Diagnostic Tests

Standard Problem	Used test	H0	Test value	P-value	Statistical decision
Heteroskedasticity	Lagrange Multiplier (LM) Test	Presence of homoscedasticity	2462.73	0	Rejection of H0
Serial correlation	Wooldridge Test	No autocorrelation	F= 72.15	0.0004	Rejection of H0
Cross-sectional Dependence	Pesaran CD Test	Errors are independent across sections	-1.061	1.7112	No rejection of H0

Source: Prepared by the author based on Stata18 outputs

The diagnostic test findings presented in Table (5) indicate the following:

The Lagrange multiplier test (LM test) indicated a significant calculated value of 2462.73 for the issue of heteroskedasticity, with a corresponding probability value (P-value) of 0.0000. This outcome, significantly below the 5% significance threshold, offers definitive evidence against the homoskedasticity hypothesis, affirming that the variance of the model errors is not uniform across the sample countries.

The Wooldridge test was utilized to identify first-order serial correlation in the model residuals. The test produced an F-statistic of 72.15, accompanied with a P-value of 0.0004. This substantial number compels us to reject the null hypothesis of absent serial correlation and affirms that the model's random errors within a certain time frame are correlated with their preceding values, necessitating adjustment.

The results of the cross-sectional dependence test was entirely dissimilar. The Pesaran CD test yielded a computed value of -1.061 and a p-value of 1.7112. The p-value, significantly beyond any acceptable significance threshold, indicates a lack of statistical evidence to reject the null hypothesis about the independence of errors across sections. Consequently, it can be inferred that the model is not affected by spatial dependence among the sampled countries.

The statistical diagnosis revealed that the random effects model is significantly affected by heteroskedasticity and serial correlation, however it is devoid of cross-sectional dependence issues. This diagnostic indicates the necessity of employing robust estimation methods that can simultaneously handle both issues to assure precise standard errors and reliable estimations.

3.6. Robust Estimation: The FGLS Approach

Upon confirming the existence of heteroskedasticity and serial correlation issues in the reference model, the FGLS approach was employed as the definitive model to get robust and reliable estimations. Table (6) presents the outcomes of this revised model.

Table (6): Results of the Revised FGLS Model Estimation

Variable	Coefficient	Standard error	Z-statistic	P-value
ln_GRF (Green Finance)	0.444***	0.138	3.22	0.001
ln_GDP (Gross Domestic Product)	-0.417**	0.188	-2.22	0.026
ln_INTR (Interest	0.057	0.056	1.02	0.305

Rate)				
ln_INF (Inflation)	0.053	0.05	1.06	0.291
Constant	11.819***	1.376	8.59	0
(4) Wald chi2	13.5			0.0091
Nbr of views	60			

Source: Prepared by the author based on Stata18 outputs

The Wald chi-squared score of 13.50, accompanied by a p-value of 0.0091, signifies that the model is statistically significant, indicating that the independent variables collectively possess substantial explanatory power regarding variations in financial market performance. The results about the impact of each specific variable are as follows:

Green Finance (ln_GRF): This variable is paramount in the study, exhibiting a robust, positive, and highly significant impact on financial market performance. The coefficient is 0.444, accompanied by a p-value of 0.001, significantly lower than the reference p-value of 0.05. This signifies that a 1% rise in the Green Finance Index correlates with an enhancement in the Financial Market Performance Index of roughly 0.44%, assuming other variables remain constant. This robust outcome corroborates the primary hypothesis of the study, suggesting that the inclination towards green investments and initiatives conveys a favorable message to investors in Arab markets, enhancing their confidence and elevating market performance.

The estimation results indicated a negative and statistically significant impact of **gross domestic product (ln_GDP)** on market performance, with a coefficient of -0.417 and a p-value of 0.026. This outcome is unexpected and contradicts econometric theory. Nonetheless, it may indicate the particularity of the sampled economies. In certain rentier economies, GDP growth, influenced by factors such as oil prices, may not correlate directly with stock market performance, which encompasses diverse sectors. This may also signify the existence of more intricate interactions that have not been documented. The restricted quantity of companies on Arab financial markets diminishes their link with broader economic activity. This negative link may indicate a temporal delay between economic development and market performance, whereby GDP growth exerts short-term pressure, but the market may experience favorable effects in the long run.

Concerning **interest rates (ln_INTR)** and **inflation (ln_INF)**, both variables exhibited a statistically insignificant effect on financial market performance in this revised model, with p-values of 0.305 and 0.291, respectively. Upon revising measurement discrepancies, it was determined that monetary policy (interest rates) and inflationary pressures were not the pivotal factors influencing the performance of Arab financial markets during the study period, in contrast to other variables.

4. Algeria case study :

This section first examines the characteristics of the Algerian financial market and the various challenges it encounters, followed by Algeria's initiatives in adopting the concept of green finance.

4.1. The Algerian Financial Market:

The Algerian Stock Exchange was founded in 1997 as a component of an economic reform intended to diversify finance sources beyond the banking sector. Nonetheless, its performance has been constrained relative to other Arab markets. The quantity of listed companies does not surpass six, and liquidity is deficient, rendering it less appealing to both domestic and international investors. (Service, 2024). The 2024 listing of Credit Populaire d'Algerie (CPA) elevated the market capitalization to roughly 522 billion Algerian dinars, with the stock exchange experiencing a 40.07% growth in the first quarter of 2025, the highest in the Arab world, as reported by the Arab Monetary Fund and the Algerian Press Service (APS). (Service, 2025). The market has exhibited poor performance attributed to a lack of listings, a

feeble investment culture, and the prevalence of bank funding. The government is actively striving to augment the stock exchange's efficacy by promoting listings from public and private companies, while also integrating innovative financial tools like instruments and green bonds. Consequently, the Algerian Stock Exchange continues to be a modest emerging market with potential, contingent upon regulatory reforms that support the advancement of Arab financial integration.

4.2. Algeria's Initiatives in Green Finance:

In its initiative to advance green finance, Algeria has created a consortium of specialist funds to facilitate sustainable development and environmental conservation projects. The following table provides a summary of these points:

Table (7): Principal funding facilitating green finance initiatives in Algeria

Fund	Area of intervention
National Fund for the Environment and Pollution Control	- Support and encourage activities focused on monitoring pollution at its source. - Promote investments that integrate clean technology into projects.
National Fund for Territorial Planning and Sustainable Development	- Invest in economic projects that utilize clean technologies. - Establish projects and work to restructure the urban fabric
Fund for Combating Desertification in Pasture and Steppe Areas	- Work to increase livestock production in steppe areas and improve poultry production. - Contribute to combating desertification and land reclamation.
Regional Equipment and Development Fund	- Support programs and activities linked to national policies on regional and environmental planning. - Fund local associations and provide the necessary subsidies for balanced regional development activities.
National Fund for the Protection of Coasts and Coastal Areas	- Support and assist pollution reduction projects to protect coasts and coastal areas. - Encourage studies, research, and initial expertise in landscape improvement.

Source: (Ounissi, 2025, pp. 176-177)

4.3. Potential solutions for advancing the financial market and green financing in Algeria:

The primary practical solutions for advancing the financial market and green finance in Algeria can be categorized into three principal phases. In the immediate future, these measures encompass promoting company listings via tax incentives, enhancing liquidity through market makers, decreasing settlement durations, digitizing the stock exchange, and establishing mechanisms for remote investment account creation. In the medium term, sovereign green bonds and instruments ought to be issued as market benchmarks, establishing green funds or indexes, developing a national classification for green activities, and offering pertinent tax advantages to investors. The long-term strategy necessitates the establishment of a national project preparation facility for municipalities and small to medium-sized companies, the enhancement of transparency and disclosure in alignment with international norms, and the formation of a national sustainable finance committee to coordinate institutional initiatives. Through this incremental strategy, Algeria can evolve from a constrained financial market to a more appealing and efficient platform for financing sustainable development initiatives.

Conclusion

This study aimed to fulfill a primary objective: to quantify and comprehend the correlation between green finance and financial market performance in a sample of six Arab countries (Saudi Arabia, Qatar,

Morocco, Tunisia, Jordan, and Egypt) from 2015 to 2024. In relation to Algeria, an integrated econometric methodology was employed for panel data, beginning with fundamental static models, advancing through comprehensive diagnostic tests, and concluding with the implementation of robust estimation models designed to resolve the identified statistical issues. The study, which emphasizes the Algerian financial industry and the initiatives conducted by Algeria to adopt green finance, culminated in significant findings that are described together with corresponding recommendations as follows:

Main findings:

1. The favorable effect of green finance: The principal and substantial conclusion of this study was the affirmative and markedly significant impact of green finance on the performance of Arab financial markets. The revised Forward Generalized Least Squares (FGLS) model shown that heightened green financing correlates directly with enhanced financial market indicators. This discovery offers concrete proof that sustainability has transcended its status as a mere ethical notion and has evolved into a significant and motivating force for regional markets. Thus, the initial hypothesis can be dismissed, whereas the subsequent hypothesis is affirmed.
2. Insignificant impact of conventional economic factors: The conclusive findings indicated that, upon revising the basic issues, traditional macroeconomic variables such as inflation and interest rates exerted no substantial effect on market performance. This outcome indicates that the dynamics of regional financial markets may be influenced by contemporary issues, such as sustainability trends, rather than conventional monetary policies throughout the study period.
3. The Algerian financial market is characterized by its fragility, marked by a scarcity of investors, attributable to the insufficient investment culture among individuals and institutions concerning the significance of investing in the stock market and sustainable products.

Recommendations:

In light of the above findings, the study presents a series of recommendations aimed at diverse stakeholders:

Recommendations for policymakers and regulatory authorities:

- Promoting green financial instruments: Governments and central banks in Arab countries should develop regulatory frameworks that incentivize the issuance and trading of green bonds and instruments, as well as offer tax or regulatory benefits to companies that implement sustainable initiatives.
- Improving transparency and disclosure: Publicly traded companies must be mandated to reveal their environmental, social, and governance (ESG) performance, facilitating informed investment decisions for investors and augmenting market appeal to sustainability-oriented investors.

Recommendations for financial institutions and corporations:

- Banks and investment institutions should create novel green financial instruments, such as green loans and exchange-traded funds (ETFs), that target companies with exceptional environmental performance to leverage this incremental strategy.
- Incorporating sustainability into strategies: Publicly traded companies should perceive sustainability not as an expense, but as an investment opportunity that augments their long-term market value and draws new segments of investors.

References

- (AFCM), A. F. (2023). *Annual report 2023*. Beirut: AFCM.
- (AFCM), C. I. (2022). *Middle East capital markets: Characteristics and challenges*. Beirut: AFCM.
- (UASA), U. o. (August 2025). https://www.uasa.ae/en/useful_links.aspx: Official website. Retrieved 5, Group., G. G. (2016). *G20 Green Finance Synthesis Report*.

- Liu, Y. &. (December 2023). *The impact of green finance on enterprise investment and financing*. Finance Research Letters, Elsevier, vol. 58, pp.104-116.
- Luo, S. (August 2025). *Nurturing Finance and Harvesting Intelligence: The Green Growth of Urban Industrial Intelligence Fueled by Green Finance*. Research in International Business and Finance, Vol. 80, pp. 103-115.
- OCDE. (2020). *Perspectives économiques de l'OCDE*. Numéro 2.
- Ounissi, A. &. (March 2025). *Arab experiences of green financing in reducing carbon emissions*. Journal of Economics and Sustainable Development, pp.170-187.
- Service, A. P. (April 2025). *La valeur du marché de la Bourse d'Alger enregistre la croissance la plus rapide au niveau arabe au cours du premier trimestre 2025*.
- Service, A. P. (December 2024). *Bourse d'Alger: Hausse de 4,5 % de la valeur transigée au 2e semestre 2024*.
- Seznec, J.-F. &. (2024). *The financial markets of the Arab Gulf*. London: Routledge.
- Wan, Q. Q. (December 2022). *Green finance and carbon reduction: Implications for green recovery*. . Economic Analysis and Policy, Vol.76, pp. 901–913.
- Wang, Y. &. (October 2021). *Fostering green development with green finance: An empirical study on the environmental effect of green credit policy in China*. Journal of Environmental Management, vol. 269, pp.113-159.
- Yao, D. Z. (2025). *Effect of green inclusive finance on carbon emission efficiency: Empirical evidence from provincial panel data in China*. International Review of Financial Analysis, vol 106.
- Zhang, D. W. (2021). *The impact of green finance on economic development and environmental quality: A study of Asian economies*. Journal of Cleaner production .
- Zheng, L. W. (May 2025). *The impact of green financing on renewable energy growth in China: Insights from provincial data*. Renewable Energy.
- Al-Arabi, S. A. (2022). *Green Financing*. United Arab Emirates.
Climate Bonds Initiative (CBI), *Annual Green Bond Reports*
World Bank Green Bond Impact Reports
BloombergNEF – Green Finance Statistics
Refinitiv Eikon – Green Loan & Bond Issuance
Arab Monetary Fund Reports on Financial Markets
Official Reports from Ministries of Finance or Central Banks in Arab Countries
- Md. Sazib Miyan, C. W. H. Cheong, Arshian Sharif, Sahar Afshan, (2024), *Three Decades of Green Finance: The State of the Art and Way Forward*, International Journal of Energy Economics and Policy, vol.14, No. 6, pp.88-105
- Jaishree, Dogga, (2025), *Unveiling research trends on the nexus between green finance and sustainable development: a systematic bibliometric review*, Discover Sustainability, Vol.6, pp. 577-590.
- Faryal Fahim & Batiah Mahadi, (2022), *Green supply chain management/green finance: a bibliometric analysis of the last twenty years by using the Scopus database* , Environmental Science and Pollution Research, Vol. 29, N. 56, pp. 84740-84714.
- Zournatzidou, G. (2025). *Green Finance and Sustainable Development: Investigating the Role of Greentech Business Ecosystem Through PRISMA-Driven Bibliometric Analysis*, Administrative Sciences, Vol. 15, N. 4, Article 150.
- Sharma, H., & Jain, S. (2025). *Mapping the Evolution of Green Finance for Environmental Sustainability through Bibliometric Analysis*. Discover Sustainability, Vol. 6, Article 799.
- Flottmann, C., Köchling, G., Neukirchen, D., et al. (May 2025). *Green Debt: A Systematic Literature Review and Future Research Agenda*. Management Review Quarterly.

Appendices List:

Appendix I: Core Models

```
. regress ln_INDEX ln_GRF ln_GDP ln_INTR ln_INF
```

Source	SS	df	MS	Number of obs	=	60
				F(4, 55)	=	7.34
Model	9.97978245	4	2.49494561	Prob > F	=	0.0001
Residual	18.704003	55	.340072782	R-squared	=	0.3479
				Adj R-squared	=	0.3005
Total	28.6837854	59	.486165855	Root MSE	=	.58316

ln_INDEX	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
ln_GRF	.0653108	.205474	0.32	0.752	-.3464683	.4770899
ln_GDP	-.7994849	.1822817	-4.39	0.000	-1.164786	-.4341842
ln_INTR	.4736344	.1596114	2.97	0.004	.1537661	.7935027
ln_INF	.2612866	.2327035	1.12	0.266	-.2050616	.7276348
_cons	13.90523	1.351669	10.29	0.000	11.19643	16.61404

3086

```
. xtreg ln_INDEX ln_GDP ln_GRF ln_INTR ln_INF , fe
```

```
Fixed-effects (within) regression      Number of obs   =       60
Group variable: ID                    Number of groups =        6
```

```
R-squared:                            Obs per group:
    Within = 0.6345                      min =       10
    Between = 0.0511                     avg  =      10.0
    Overall = 0.0091                     max  =       10
```

```
corr(u_i, Xb) = -0.4542                F(4, 50)        =      21.70
                                      Prob > F          =      0.0000
```

ln_INDEX	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
ln_GDP	.4393436	.1854197	2.37	0.022	.0669172	.81177
ln_GRF	.1816381	.084394	2.15	0.036	.0121278	.3511485
ln_INTR	.0192503	.0506367	0.38	0.705	-.0824565	.1209571
ln_INF	.1330957	.0508275	2.62	0.012	.0310055	.2351858
_cons	5.063281	1.411574	3.59	0.001	2.228051	7.898511
sigma_u	.83662539					
sigma_e	.11347424					
rho	.98193593	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(5, 50) = 280.52                Prob > F = 0.0000
```



```
. xtreg ln_INDEX ln_GDP ln_GRF ln_INTR ln_INF , re
```

```
Random-effects GLS regression           Number of obs   =          60
Group variable: ID                     Number of groups =           6
```

```
R-squared:                               Obs per group:
    Within = 0.6342                        min =          10
    Between = 0.0496                       avg =         10.0
    Overall = 0.0073                       max =          10
```

```
corr(u_i, X) = 0 (assumed)              Wald chi2(4)      =       88.92
                                          Prob > chi2       =       0.0000
```

ln_INDEX	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
ln_GDP	.4038944	.1784856	2.26	0.024	.0540691	.7537198
ln_GRF	.1940117	.0816312	2.38	0.017	.0340175	.3540059
ln_INTR	.0186891	.0496406	0.38	0.707	-.0786047	.1159828
ln_INF	.1338358	.049995	2.68	0.007	.0358474	.2318243
_cons	5.331525	1.420214	3.75	0.000	2.547958	8.115093
sigma_u	1.0326067					
sigma_e	.11347424					
rho	.98806805	(fraction of variance due to u_i)				

Appendix II: Model Selection Tests

Breusch and Pagan Lagrangian multiplier test for random effects

```
ln_INDEX[ID,t] = Xb + u[ID] + e[ID,t]
```

Estimated results:

	Var	SD = sqrt(Var)
ln_INDEX	.4861659	.6972559
e	.0128764	.1134742
u	1.066277	1.032607

Test: Var(u) = 0

```
chibar2(01) = 167.69
Prob > chibar2 = 0.0000
```

```
. hausman fixed_model random_model, sigmamore
```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) Std. err.
	(b) fixed_model	(B) random_model		
ln_GDP	.4393436	.4038944	.0354492	.0377225
ln_GRF	.1816381	.1940117	-.0123736	.0151903
ln_INTR	.0192503	.0186891	.0005612	.0042216
ln_INF	.1330957	.1338358	-.0007401	.0011188

b = Consistent under H0 and Ha; obtained from **xtreg**.
 B = Inconsistent under Ha, efficient under H0; obtained from **xtreg**.

Test of H0: Difference in coefficients not systematic

```
chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = 2.31
Prob > chi2 = 0.6783
```

Appendix III: Measurement Issues

```
. xtcsd, pesaran
```

Pesaran's test of cross sectional independence = -1.061, Pr = 1.7112

```
. xtserial ln_INDEX ln_GDP ln_GRF ln_INTR ln_INF
```

Wooldridge test for autocorrelation in panel data

```
H0: no first-order autocorrelation
F( 1, 5) = 72.152
Prob > F = 0.0004
```

* Panel Groupwise Heteroscedasticity Tests

H0: Panel Homoscedasticity - Ha: Panel Groupwise Heteroscedasticity

```
- Lagrange Multiplier LM Test    =2462.7349    P-Value > Chi2(5)    0.0000
- Likelihood Ratio LR Test       = 18.4653    P-Value > Chi2(5)    0.0024
- Wald Test                      = 4.63e+04    P-Value > Chi2(6)    0.0000
```

Appendix IV: Corrected Model

```
. xtglsl ln_INDEX ln_GDP ln_GRF ln_INTR ln_INF , panels(heteroskedastic) corr(ar1)
```

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares

Panels: heteroskedastic

Correlation: common AR(1) coefficient for all panels (0.9133)

Estimated covariances	=	6	Number of obs	=	60
Estimated autocorrelations	=	1	Number of groups	=	6
Estimated coefficients	=	5	Time periods	=	10
			Wald chi2(4)	=	13.50
			Prob > chi2	=	0.0091

ln_INDEX	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
ln_GDP	-.4172794	.1878825	-2.22	0.026	-.7855223	-.0490366
ln_GRF	.4443036	.1381893	3.22	0.001	.1734575	.7151497
ln_INTR	.0573151	.0559263	1.02	0.305	-.0522984	.1669286
ln_INF	.0525694	.0497609	1.06	0.291	-.0449602	.150099
_cons	11.81922	1.375527	8.59	0.000	9.12324	14.51521

.